City of Monroe

Utility Systems Plan

Sanitary Sewer, Water and Stormwater

April 2, 2015 – Draft

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City of Monroe

UTILITY SYSTEMS PLAN

Sanitary Sewer, Water and Stormwater

April 2, 2015 – Draft

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PROJECT CERTIFICATION

City of Monroe

Utility Systems Plan
Sanitary Sewer, Water and Stormwater

The technical material and data contained in this plan was prepared by BHC Consultants, LLC under the supervision of the below listed individuals. Those responsible staff members who are registered professional engineers are licensed in the State of Washington.

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City of Monroe
Utility Systems Plan

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GLOSSARY

100-year flood: The magnitude of a flood likely to occur, on average, once every 100 years.
Average Wet Weather Flow: Wastewater flow during period when groundwater table is high and precipitation is at its peak, generally the four wet weather months, from November to February.
Class 1 Stream: A perennial or intermittent stream that is used by threatened or endangered fish or larger numbers of other fish, or that is used as a direct source of water for domestic use.
Force Main: Pressurized discharge pipe from a lift station.
Infiltration: Groundwater entering the sewage collection system through defective joints, pipes, and improperly sealed manholes.
Inflow: Sewage flows resulting from stormwater runoff entering the sewage collection system, typically through manhole covers, roof leaders, and area drains connected directly to sewer, cross connections from storm drains and catch basins, and direct flows into broken sewers.
Maximum Monthly Flow: Average daily flow during the highest flow month of the year.
Mini-Basin: Drainage catchment areas within the North Creek, Swamp Creek, Picnic Point, Everett or Little Bear Creek Drainage Basins. Mini-basins followed the King County delineation to the extent of the County's effort to define the mini-basins.
National Flood Insurance Program: Federally funded program providing flood insurance to property owners in flood plains provided the local government meets certain criteria for management of flood damage risk.
Orange Book: *Criteria for Sewage Works Design,* published by the Washington State Department of Ecology
Peak Hourly Flow: Wastewater flow during the highest flow hour.
Sensitive Area: Area in which development potential is limited by environmental factors such as steep slopes, wetlands, and valuable natural habitat.
Sewer Lateral: A sewer with no other common sewers discharging into it.
Sewer Submain: A sewer that receives flow from one or more lateral sewers.
Sewer Main or Trunk: A sewer that receives flow from one or more submains.
Sewer Interceptor: A sewer that receives flow from a number of main or trunk sewers, force mains, etc.
Urban Growth Area: Area in which urban development must be contained, as stipulated by the Growth Management Act.

ABBREVIATIONS

AAF	Average Annual Flow
ADWF	Average Dry Weather Flow
AWWD	Alderwood Water and Wastewater District
AWWF	Average Wet Weather Flow
BOD	Biological Oxygen Demand
CFR	Code of Federal Regulations
CIP	Capital Improvement Program
CWA	Clean Water Act
DOH	Washington State Department of Health
DOE	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
ERU	Equivalent Residential Unit
ESA	Endangered Species Act
FEMA	Federal Emergency Management Act
FOG	Fats, Oils and Greases
FPS	Feet per second
FWPCA	Federal Water Pollution Control Act (“The Clean Water Act”)
GMA	Growth Management Act
GPCD	Gallons per capita per day
GPAD	Gallons per acre per day
GPD	Gallons per day
HPA	Hydraulic Project Approval
I/I	Infiltration and Inflow
JARPA	Joint Aquatic Resources Permit Application
KCDNR	King County Department of Natural Resources
MMF	Maximum Month Flow
MBR	Membrane Bioreactor
MGD	Million Gallons per Day
mg/l	milligrams per liter
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
OCD	Washington State Office of Community Development
OFM	Washington State Office of Financial Management
ppd	Pounds per day
PVC	Polyvinyl Chloride
PWWF	Peak Wet Weather Flow
RCW	Revised Code of Washington
SEPA	State Environmental Policy Act
SRF	State Revolving Fund
TSS	Total Suspended Solids
UGA	Urban Growth Area
USFWS	United States Fish and Wildlife Service
WAC	Washington Administrative Code
WWTP	Wastewater Treatment Plant

Chapter 1 Executive Summary

1.1 Introduction

This Utility Systems Plan for the sanitary sewer, water and stormwater utilities was developed as a supportive document to the City of Monroe's (City) Comprehensive Plan. This Plan is mandated by RCW 36.70A.130 (5a) and is to be completed by June 30, 2015. This Plan consists of several elements including utility system plans for the City-provided and City-owned utilities. The Comprehensive Plan is being lead by Studio Cascade. The evaluation of these three utility systems is presented and bound in this volume.

Since there are elements that are common to each of the three plans, the organization of this volume seeks to minimize repeated presentation of the same information. Consequently, the first chapters of this volume are common to all the utilities and are presented once. The utility-specific information is compiled and presented in separate sections of this volume. And lastly, the prioritization of the Capital Improvement Program (CIP) and the accompanying financial analysis is presented in a composite fashion in Chapter 12. The general format and presentation of this volume is as follows:

GENERAL INFORMATION

Chapter 1 –	**Executive Summary.** Presents the projected loadings and flows for all three utilities and a summary and prioritization of the CIPs
Chapter 2 –	**Introduction.** Overall history of the City's Utilities, organization of the system plans, and regulations that govern the utility plans
Chapter 3 –	**Land Use and Service Areas.** Presentation of the land use, topography and service areas for each of the three utilities.

SANITARY SEWERS

Chapter SS 4 –	**Existing Wastewater Facilities.** Defines the drainage basins and the wastewater infrastructure, including the collection system, lift stations and wastewater treatment plant.
Chapter SS 5 –	**Existing and Future Population and Flow Projections.** Existing and projected population, consisting of residential, employment and student, are presented for each of the drainage basins. The accompanying flows by drainage basin are also presented.
Chapter SS 6 –	**Wastewater Conveyance Analysis.** Mini-basin delineation and hydraulic model development and calibration.
Chapter SS 7 –	**Wastewater Treatment Plant.** Evaluation of the performance of the treatment plant in relation to the NPDES limitations. Projected flows and loadings are evaluated to determine the improvements needs to insure compliance in the coming years.
Chapter SS 8 –	**Water Reclamation and Reuse.**
Chapter SS 9 –	**Operations and Maintenance Program.** Define the O&M issues associated with the sanitary sewer utility. Estimate of the manpower required in the future.
Chapter SS 10 –	**Design Criteria**
Chapter SS 11 –	**Capital Improvements Plan.** CIP for the collection, conveyance, treatment and discharge components of the sanitary sewer utility. CIP cost estimates.

WATER

Chapter W 4 –	**Description of Water System.** Describes the source of supply, water storage, pumping facilities, transmission and distribution and telemetry.
Chapter W 5 –	**Existing and Future Population, Employment and Demand Projections.** Existing and projected population, consisting of residential, employment and student, are presented for the water service boundary
Chapter W 6 –	**System Analysis.** Hydraulic model development and calibration. Identification of deficiencies and development of Capital Improvements
Chapter W 7 –	**Water Use Efficiency, Water Right Evaluation, Source Water Protection, System Reliability and Interties**
Chapter W 8 –	**Source Water Protection.**
Chapter W 9 –	**Operations and Maintenance Program.** Define the O&M issues associated with the water utility. Estimate of the manpower required in the future.
Chapter W 10 –	**Distribution Facilities Design and Construction Standards.**
Chapter W 11 –	**Capital Improvement Program.**

STORMWATER

Chapter SW 4 –	**Existing Stormwater Facilities.** Describes the watersheds and stormwater infrastructure.
Chapter SW 5 –	**Current Stormwater Management Utility Program.**
Chapter SW 6 –	**Regulatory Requirements.**
Chapter SW 7 –	**Future Program Needs.** Review of the current program and the changes that should be implemented.
Chapter SW 8 –	**Problem Identification and Solution Development.** CIP for the four known areas plus additional infrastructure that need. CIP cost estimates.
Chapter SW 9 –	**Recommendations.** Define the CIP and O&M issues associated with the stormwater utility. Estimate of the manpower required in the future.
Chapter SW 10 –	Not Used
Chapter SW 11 –	Not Used

FINANCIAL PLAN

Chapter 12 –	**Financial Plan.** Presents a composite of all CIP and prioritizes/combines CIP. Presents impacts on rate structure.

The Utility Systems Plan reviews the City's current capacities and looks at the impact of projected growth on the City's utility infrastructure.

The analysis of the utilities was done using both the current and anticipated loadings and also evaluated the future of the utilities when subjected to tightening regulations.

The Systems Plan also identifies future facilities required to accommodate the anticipated flows and loadings as the City's population grows within the service area limits for the years 2021 (sewer), 2023 (water), 2035, and buildout conditions.

The plans were prepared in conformance with local, state and federal regulations as described in Chapter 2.

1.2 Planning Data

Population, and employment population forecasts were used to estimate the current and future loadings to the City's sanitary sewer and water systems. The stormwater utility is less sensitive to residential and employment population forecasts and tends to be confined to individual drainage basins. Consequently, City wide analysis and projection of the stormwater system is less relevant.

Planning data from the Puget Sound Regional Council (PSRC) provides population forecasts based on U.S. Census data as broken down by Forecast Analysis Zones (FAZ). The PSRC data tends to be widely used throughout the region and is the database that was used in developing and analyzing the flows.

After discussions with the City staff, the PSRC forecasted values were used for the baseline population and GIS delineation was used for the distribution of growth throughout the service areas.

The service area for each of the utilities is substantially different. For example, the service area for the sanitary sewer is limited to the UGA boundaries. The service area for water, on the other hand, is much broader. Consequently the residential population, and employment population for water and sanitary followed the same general protocol, but applied to differing service areas.

The definition of these population forecasts is addressed in the respective chapters for each of the utilities.

There are three segments that comprise the served population: residential, employment and Department of Corrections (DOC). These three sectors generally capture all the sources expected in the Monroe Service Area. This approach works well in largely developed, non-industrial service areas.

With these values of existing and projected users, a population equivalent was developed recognizing that an employee or an inmate contributes a differing fraction of a permanent resident. This ratio was developed based on historical records.

1.3 Projected Sanitary Sewer Flows, Loads and Analysis

A capacity analysis of the existing City sanitary sewer network was undertaken using a spreadsheet hydraulic modeling program.

Existing lift stations and their maximum capacities also were included in the model. The flow data from the City's WWTP was largely used in calibrating the model. The sanitary sewer service area was divided into smaller service basins which are referred to as mini-basins. These mini-basin areas were consistent with the basin boundaries used in the previous System Plan.

The model was developed using information from the City's GIS electronic database, supplemented by selected as-built drawings, pump records, flow monitoring data, and with other available data such as ground elevation LIDAR information.

Models were constructed to represent the network in 2021, 2035, and build out.

Loadings and flows for the water and sanitary sewer were developed and presented in the respective utility chapters.

With the flows determined and the known population equivalence, a flow per population equivalence was determined. This historical flow data was used to project future and anticipated flows.

The I/I component is captured in and part of the peak day and peak hour per population equivalent flow values. It is important to recognize that the I/I component is reflective of current conditions and that, as the pipes continue to age and degrade, the volume of I/I entering the system will continue to increase. An allowance for that continued degradation is incorporated into the per population equivalent values for 2021, 2035 and build out conditions.

The conservative nature of the hydraulic model tends to over-estimate the volume of the wastewater to be conveyed. This conservative approach is partially offset by allowing a brief and very infrequent surcharging of the gravity sewers. The allowability of such surcharging is limited to a depth over the crown of the pipe equal to the pipe diameter.

Where pipe sections were identified as requiring an upgrade, the proposed upgrade was sized to provide capacity equal to or greater than the estimated build out flows.

At lift stations where the estimated peak hour flows were shown to exceed the current maximum capacity, a suitable build out upgrade flow capacity was estimated. This capacity was incorporated into the model for the planning horizon showing evidence of capacity limitation. This enabled the impact of the increased flow on the downstream sewer network to be investigated. The actual mechanical and electrical improvements to the lift stations would not be sized for the build out conditions.

1.4 Projected Water Demands and Analysis

A hydraulic analysis of the existing City water system was undertaken using a computer based modeling program.

The computer model includes source connections to the Everett Supply Pipeline, transmission mains, distribution system piping, reservoirs, pump stations, and pressure reducing valve stations. The current computer model was developed from the model used in the previous Water System Plan.

Model scenarios were developed to represent the water system subjected to existing, 2021, 2023, and 2035 water system demands.

Water demands were developed and presented in Chapter W 5.

With the demands determined and the known population equivalence, a demand per population equivalence was determined. This historical flow data was used to project future and anticipated flows.

The water system design criteria are presented in Chapter W 6. These criteria include minimum pressures of 30 psi under peak hour demand conditions and 20 psi under maximum day plus fire flow demand conditions.

Where pipe sections were identified as requiring an upgrade, the proposed upgrade was sized to provide sufficient capacity for the 2035 demand conditions.

The results of the hydraulic analysis were used to develop the capital improvement program chapter for the water utility.

1.5 Stormwater Improvements and Analysis

The Stormwater Utility System Plan is significantly different from the content and format of either the sanitary sewer or water system plans. The requirements for both the sanitary sewer and water systems are specifically mandated by the respective section in the WAC. The Stormwater System Plan, on the other hand, has general guidelines that are outlined in the NPDES rules.

Where the sanitary sewer and water system utilities are directly impacted by growth and new development, the stormwater utility is sensitive to changes in residential and employment populations. Though new development brings more impervious pavement, redevelopment or more intense use of already developed parcels has minimal impact on the volume of stormwater runoff. Consequently, population projections used in the sanitary and water utilities are not as meaningful for the stormwater utility.

The stormwater improvements and analysis focused on four known stormwater problem areas:

- Blueberry Lane
- Intersection of Blueberry Lane and North Kelsey Street
- Lake Tye
- Lords Lake

The description, analysis and recommended solution of these problem areas are presented in Chapter SW 8.

Other recommendations to satisfy the NPDES requirements are presented in Chapter SW 9. These recommendations include:

- Public Outreach and Involvement
- Illicit Discharge and Elimination Program
- Controlling new development, redevelopment and construction sites
- Operations and Maintenance
- Compliance with TMDLs
- Stormwater Monitoring
- Stormwater Management Program reporting and coordination

1.6 Capital Improvements Projects

The capital improvement projects (CIP) developed in the respective chapters are presented by time period. It should be noted that this plan has neither proposed a routing to extend sewers to every lot within the service boundary, nor was it the intention of this plan to finance those line extensions. The CIP does not include the line extensions and pump stations needed to serve presently unserved areas. These line extensions are assumed to be initiated and financed by developers or through Local Improvement Districts (LIDs). Consequently, no City financing mechanism is proposed for these lines.

The CIP is limited to the following categories:

- Existing lines that need to be upgraded/upsized to convey flows as population and flows increase
- Existing infrastructure that needs to be upgraded to accommodate increasing flows.
- Existing infrastructure that need modifications or improvements. This might include equipment that has reached or are soon to reach their useful life, needed new features, and stations that are slated to be abandoned or rerouted.
- Chronic maintenance areas that can be resolved with a capital project.
- WWTP improvements to respond to increasing flows, loads or new regulations

Cost estimates for each CIP was prepared based on current year (2015) pricing. Detailed cost estimates can be found in the respective appendices. These projects were assigned a target period for completion based on the anticipated added flows and the expectation that capacity would be exceeded by the end of that period. Those improvements shown as 2015 to 2021 (sanitary sewer and stormwater) or 2015 to 2023 (water) projects are those projects that have current or soon anticipated capacity issues and should be pursued first.

For those CIPs that are linked to aging equipment or obsolescence, an estimated date for replacement or repair has been identified. The determination of this date is tied to age and expected remaining life. It should be understood that there is some latitude in these implementation dates.

For those CIPs that are linked to inadequate capacity, a triggering metric has been estimated. This threshold trigger is represented by additional Equivalent Residential Units (ERUs). Since the specific location of these added units is critical to the downstream impacts, it is recommended that those triggering points by carefully monitored as those thresholds are approached.

Those that are in subsequent periods of 2021 (or 2023) to 2035 and 2035 to Build Out are projects that should be completed on or before that end target year. Capital Improvements Projects to be financed as described in Chapter 12 and summarized in Table 1-1.

Table 1-1 Capital Improvement Projects			
CIP No.	Decription	2015 to 2021 - sewer and storm 2015 to 2023 - water	2021 to 2035 - sewer and storm 2023 to 2035 - water
Sanitary Sewer CIP - Conveyance and Treatment			
SS-1	Gravity Sewer Replacement from DOC to Park Place Pump Station	$550,000	
SS-2	Cate's Pump Station Upgrades	$450,000	
SS-3	West Main Pump Station Upgrades	$450,000	
SS-4	$500,000/yr Pipe replacement projects	$3,000,000	
SS-5	WWTP Rerating Study	$30,000	
SS-6	Biosolids Management Study	$50,000	
SS-7	Primary Clarifier Equipment Replacement	$920,000	
SS-8	WWTP Engineering Report	$100,000	
SS-9	Mechanical Sludge Thickener	$1,350,000	
SS-10	Belt Filter Press Hood	$180,000	
SS-11	Operations and Dewatering Building Roof Replacement	$190,000	
SS-12	$100,000/yr WWTP Maintenance	$600,000	
SS-13	CEPT Implementation	$280,000	
SS-14	Digester Blower Replacement	$1,100,000	
SS-15	42-foot Diameter Secondary Clarifier Mechanism Replacement	$580,000	
SS-101	Park Place PS Upgrades		$950,000
SS-102	Fyelands PS and FM Upgrades		$2,900,000
SS-103	Beaton PS Upgrades		$450,000
SS-104	Fox Meadows PS Upgrades		$450,000
SS-105	Old Owens PS Upgrades		$450,000
SS-106	Valley View Pump Station Upgrades		$1,492,000
SS-107	South Freylands Pump Station Upgrades		$860,000
SS-108	New Dewatering Unit		$1,600,000
SS-109	Turbine Blowers		$500,000
SS-110	SCADA and Control Upgrade		$550,000
SS-111	Sludge Dryer		$8,300,000
SS-112	Secondary Clarifier Mechanism Replacement		$810,000
SS-113	RAS/WAS Pump Replacement		$700,000
SS-114	Effluent PS Replacement		$550,000
Water CIP			
W-1	DOC Storage	$3,000,000	
W-2	Spring Hill Reservoirs - Mixing NaOCl	$30,000	

Table 1-1 Capital Improvement Projects			
		2015 to 2021 - sewer and storm 2015 to 2023 - water	2021 to 2035 - sewer and storm 2023 to 2035 - water
W-3	Lord Hill Reservoir fencing	$25,000	
W-4	Flushing Devices at deadends	$10,000	
W-5	Replace 8" at Chain Lake Road	$1,737,000	
W-6	Replace 6" at Tester and Hwy 522	$1,146,000	
W-7	Replace 12" at Trombley reservoirs	$199,000	
W-8	Replace 12" at Fairgrounds	$430,000	
W-9	Replace 10" at Fairgrounds	$110,000	
W-10	Replace 8" Hwy 2 and Cascade View Dr	$839,000	
W-11	Extend 12" Cascade View Dr - theatre	$407,000	
W-12	Replace 8" along Wagner Rd to Salem Woods	$939,000	
W-13	Extend 12" along Wagner to Wagner 517	$1,119,000	
W-14	Install 8" along 127th	$160,000	
W-15	Replace 6" along 141st	$1,726,000	
W-16	177th PS - Equipment Replacement	$680,000	
W-17	Spring Hill PS - Equipment Replacement	$520,000	
W-18	Lord Hill PS Equipment Replacement	$580,000	
W-19	Annual Water Meter Replacements ($200,000/yr)	$1,600,000	
W-20	Park to Kelsey Replacement	$84,000	
W-21	182nd and 154th Replacement	$70,000	
W-22	Graden Replacement	$415,600	
W-23	132nd Replacement	$554,400	
W-24	Thrive Alley Replacement	$92,400	
W-25	Destination Alley	$108,500	
W-26	Strawberry Lane Repalcement	$96,300	
W-27	Ingraham Hill from Brown Rd to SR-2 and Old Owen	$2,800,000	
W-28	Trombley Hill from Reservoir to Airport/179th SE	$2,100,000	
W-29	132nd SE from Ingraham to Wagner Rd	$567,000	
W-30	134th SE/133rd SE/ 208th SE/209th SE	$490,000	
W-31	Alley between Madison and Sams/McDougall and Pike	$90,100	
W-32	Alley parallel to Main Street at Ferry to N. Blakely east to N. Madison	$199,500	
W-33	Alley parallel to Lewis and Blakely Freemont to McDougall	$80,500	
W-34	Connect Wagner to 116th SE to complete loop	$408,600	
W-35	Park to Kelsey in Powell	$85,800	
W-36	Park to Pike - Phase II	$83,000	

Table 1-1 Capital Improvement Projects			
		2015 to 2021 - sewer and storm 2015 to 2023 - water	2021 to 2035 - sewer and storm 2023 to 2035 - water
W-37	S Taft Lane	$42,000	
W-38	182nd SE and 154th	$95,000	
W-39	180th Avenue - Phase I	$71,000	
W-40	180th Avenue - Phase II	$71,000	
W-41	181st Avenue	$107,000	
W-42	Orr to Kelsey abandon line under houses	$48,000	
W-43	Wilson Lane	$17,000	
W-44	Circle Drive to Sumac	$76,000	
W-45	Short Columbia	$127,000	
W-46	127th Ave SE at 150th SE	$88,000	
W-47	North Hill service along 116th SE and 227th SE; connect to Wagner 517; install PRVs	$1,879,000	
W-48	Replace 4" serving FH ($50,000/yr)		$900,000
W-49	AC Pipe Replacement ($100,000/yr)		$1,800,000
W-50	Tester Road PS - Equipment Replacement		$620,000
W-51	North Hill PS Equipment Replacement		$800,000
W-52	Trombley PS - Equipment Replacement		$850,000
W-53	Replace 6" along Old Owen Rd		$443,000
Stormwater CIP			
SW-1	Blueberry Lane - Infiltration/Conveyance	$1,470,000	
SW-2	Blueberry/North Kelsey - Infiltration/Conveyance	$581,000	
SW-3	Lake Tye - Bioswale	$95,000	
SW-4A	Lord's Lake - Treatment	$398,000	
SW-4B	Lord's Lake - Bioswale/ Wet Pond	$37,800	
SW-6	Crystalwood Drainage		
SW-7	Monroe St and Park Street		
SW-8	Monroe St and Kelsey		
SW-9	Park St and Roberts St		
SW-10	Dickenson and West Columbia		$5,000,000 1)
SW-11	115 Dickenson		
SW-12	West Main Round about		
SW-13	615 North St		
Total CIP of all Utilities		$38,615,500	$30,975,000

Notes: 1) $5,000,000 of improvements for CIP Nos. SW-6 through SW-13 to be spent over the 20-year period

Chapter 2 Introduction

2.1 Purpose and Need for System Plans

The 2015 Utility System Plans are prepared for the City as supportive documentation to the City's Comprehensive Plan. These system plans met the statutory requirements mandated by the Washington Administrative Code referenced in Table 2-1.

Table 2-1 Utility System Plan Requirements

Sanitary Sewer System Plan WAC 173-240-050		Water System Plan WAC 246-290-100		Stormwater System Plan No WAC Stipulated Requirements
WAC	***Description***	***WAC***	***Description***	***Description***
3a	Purpose for plan	4a	Description of the system	Purpose for plan
3b	Ownership and O&M responsibilities	4a(i)	Ownership and O&M responsibilities	History Utility goals & policies
3c	Service boundaries	4a(ii)	System history & background	Public involvement Study area description
3d	Existing sewers Proposed sewers Topography Streams, Lakes Water systems	4a(iii)	Coordination with other water system plans	Existing system Watershed delineation
		4a(iv)	Service boundaries	Stormwater utility description
		4b(i)	Current population water use and ERUs	
3e	Population trends			O&M
3f	Wastewater facilities within 20 miles	4b(ii)	Identify water consumption trends	CIP and future needs Regulatory requirements
3g	I/I problems	4b(iii)	Designated land use	City
3h	Adequacy of treatment systems		Future population Water demand 6 & 20 yrs	State
3i	Industrial wastewater sources	4c&d		Federal
3k	Collection alternatives	4e	Demand forecasts with and without water conservation System analysis	Problem identification Hydraulic model analysis
3l	Treatment alternatives	4e(i)	Design standards	Financial analysis
	Disposal alternatives	4e(ii)	Water quality analysis	Public information
	Construction cost estimate	4e(iii)	System inventory	Public hearings/meetings
	O&M cost estimates	4e(iv)	System deficiencies	
	Financial plan	4f(i)	Design standards	
3m	Compliance with management plan	4f(ii)	Water supply alternate	
		4f(iii)	Emergency response	
3n	SEPA compliance	4f(iv)	Water rights	
		4f(v)	Supply reliability	

Table 2-1 Utility System Plan Requirements				
Sanitary Sewer System Plan WAC 173-240-050		**Water System Plan WAC 246-290-100**		**Stormwater System Plan No WAC Stipulated Requirements**
WAC	***Description***	***WAC***	***Description***	***Description***
	OTHER REQUIREMENTS / ELEMENTS	4f(vi)	Interties	
		4g	Sources water protection	
	SSSHB 1338 Water reuse	4h	O&M program	
	CMOM	4i	CIP	
	Public information	4j	Financial program	
	Public hearings/meetings	4k(i)	SEPA	
		4k(ii)	Interlocal agreements	
			OTHER REQUIREMENTS / ELEMENTS	
			Public information	
			Public hearings/meetings	

The requirements for each of the utilities are addressed in the respective chapters dedicated to the specific utility. A roadmap of where each requirement can be found follows in Table 2-2 for the Sanitary Sewer Utility, in Table 2-3 for the Water Utility and in Table 2-4 for the Stormwater Utility.

Table 2-2 Sanitary Sewer Utility Plan Requirements per WAC 173-240-050

Reference Paragraph	Description of Requirement	Location in Document
3a	Purpose and need for proposed plan	Section 2.1
3b	Who will own, operate, and maintain system	Section 2.2
3c	Existing and proposed service boundaries	Chapter SS 4
3d	Layout map showing boundaries; existing sewer facilities; proposed sewers; topography and elevations; streams, lakes; and other water bodies; water systems	Figures 2.2, 2.3
3e	Population trends	Chapter SS 5
3f	Existing domestic and/or industrial wastewater facilities within 20 miles	Figure 2.1
3g	Infiltration and inflow problems	Section SS 5.4
3h	Treatment systems and adequacy of such treatment	Chapter SS 7
3i	Identify industrial wastewater sources	Section SS 5.2.1
3k	Discussion of collection alternatives	Chapter SS 6

Table 2-2 Sanitary Sewer Utility Plan Requirements per WAC 173-240-050		
Reference Paragraph	**Description of Requirement**	**Location in Document**
3k	Discussion of treatment alternatives	Chapter SS 7
3k	Discussion of disposal alternatives	Chapter SS 7
3l	Define construction cost and O&M costs	Chapter SS 11 and Appendix SS-F
3m	Compliance with management plan	Section 3.3.1
3n	SEPA compliance	See EIS for City Comprehensive Plan
	OTHER REQUIREMENTS / ELEMENTS	
SSSHB 1338 CMOM	Water Reuse Capacity, Maintenance, Operations and Management	Chapter SS 8 Chapter SS 9

Table 2-3 Water System Utility Plan Requirements per WAC 246-290-100		
Reference Paragraph	**Description of Requirement**	**Location in Document**
4a	Description of the system	Section W 4.3
4a(i)	Ownership and O&M responsibilities	Section W 4.1 and Chapter W 9
4a(ii) 4a(iii) 4a(iv) 4b(i)	System history & background Coordination with other water system plans Service boundaries Current population water use and ERUs	Section W 4.2 Section W 4.4 Section W 5.1 Section W 5.1
4b(ii)	Identify water consumption trends	Section W 5.1
4b(iii)	Designated land use	Section W 5.2
4c&d 4e	Future population Water demand 6 & 20 years Demand forecasts with and without water conservation System analysis	Section W 5.2
4e(i)	Design standards	Section W 6.1
4e(ii)	Water quality analysis	Section W 6.2
4e(iii)	System inventory	Section W 4.3
4e(iv)	System deficiencies	Section W 6.3
4f(i)	Design standards	Section W 6.1
4f(ii)	Water supply alternate	Section W 6.3.1
4f(iii)	Emergency response	Section W 9.5
4f(iv)	Water rights	Section W 7.6
4f(v)	Supply reliability	Section W 7.7
4f(vi) 4g	Interties Sources water protection	Section W 7.8 Chapter W 8

Table 2-3 Water System Utility Plan Requirements per WAC 246-290-100		
Reference Paragraph	**Description of Requirement**	**Location in Document**
4h	O&M program	Section W 9.5
4i	CIP	Chapter W 11
4j	Financial program	Chapter 12
4k(i)	SEPA	See City's Comprehensive Plan EIS
4k(ii)	Interlocal agreements	Appendix W-B and Section W 4.5
	OTHER REQUIREMENTS / ELEMENTS	
	Public information	See City's Comprehensive Plan
	Public hearings/meetings	See City's Comprehensive Plan

Table 2-4 Stormwater System Utility Plan Requirements		
Reference Paragraph	**Description of Requirement**	**Location in Document**
	Purpose for plan	Chapter SW 5
	History	Section 2.3.3
	Utility goals & policies	Chapter SW 6
	Public involvement Study area description Existing system Watershed delineation Stormwater utility description O&M	Section SW 5.3.5 Section SW 4.3 Section SW 4.3 Section SW 5.3
	CIP and future needs	Chapter SW 9
	Regulatory requirements	Chapter SW 6
	Problem identification Hydraulic model analysis	Chapter SW 8
	Financial analysis	Chapter 12
	Public information	See City's Comprehensive Plan
	Public hearings/meetings	See City's Comprehensive Plan

The Plan provides a comprehensive guide to assist the City with managing and operating the three utilities and coordinating expansions and upgrades to the infrastructure for the next twenty years. The Plan serves as a guide for policy development and decision making for the City. It also provides other agencies and the public with information on the City's plans for utility extensions within the City's service area. This approach allows the City to provide high quality service to its customers and to continue protecting environmental quality.

The Plan evaluates existing and future capacity of the utility systems based on current and anticipated future growth. Future sanitary and water flow rates are estimated from existing flow data and population growth projected within the service areas.

An implementation plan is provided, including an estimated timeline for constructing selected projects. The financial analysis and the means by which the improvements were to be financed were addressed in Chapter 12. This chapter was prepared by FCS Group in close coordination with BHC and the City.

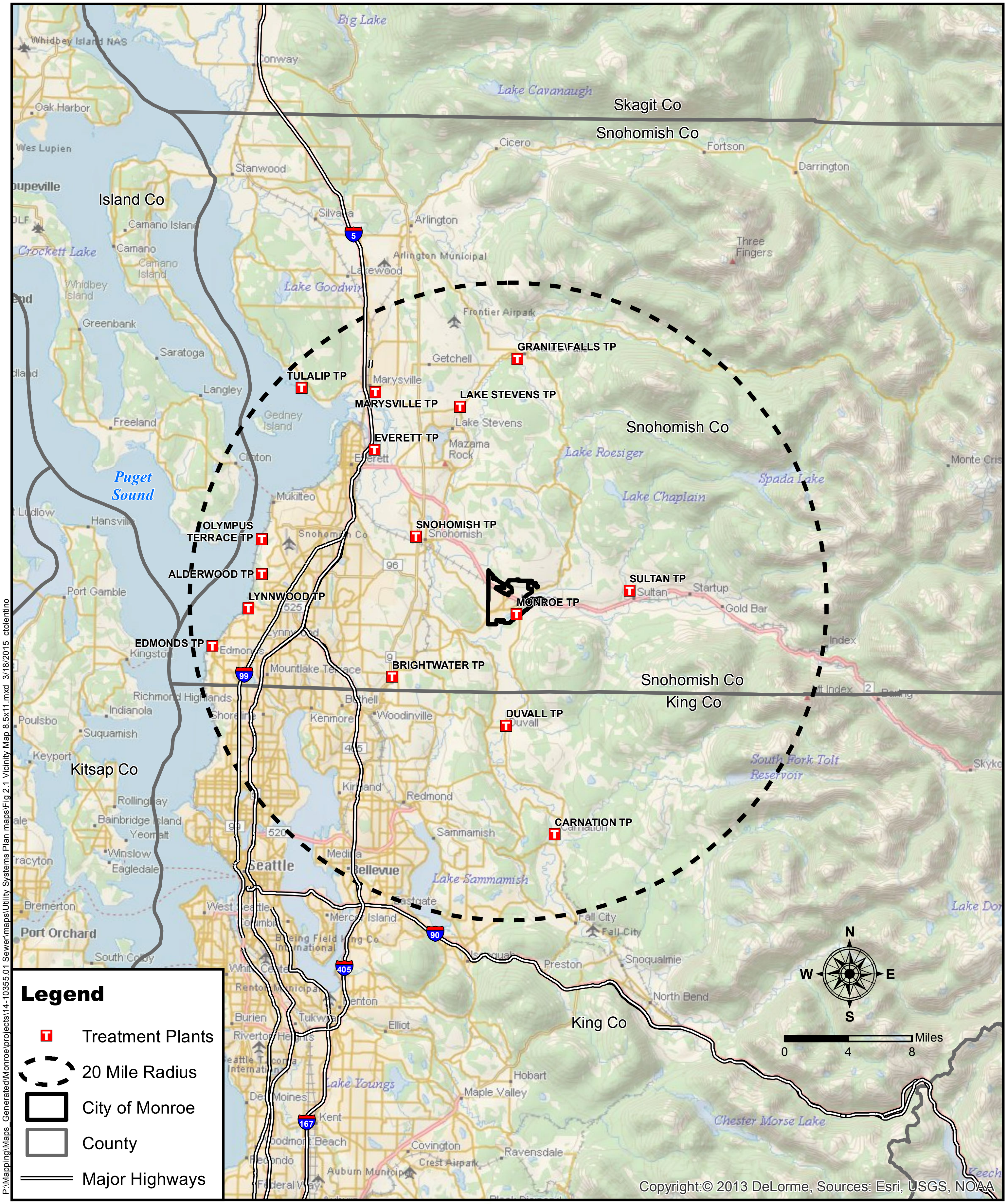
2.2 Ownership and Management

The City owns and maintains public utilities for the sanitary sewer, water and stormwater systems and is governed by a City Council. The City has interlocal agreements to provide these utilities to surrounding areas that are contiguous to the City corporate boundaries. These agreements are further explained in Chapter 3.

The City's sanitary sewer, water and stormwater systems are under the management of the Operations and Maintenance Division Manager. The treatment plant is operated and managed under the direction of the Plant Manager. Additional Engineering and Administrative and Engineering employees do not report to the Managers mentioned above.

2.3 System Histories and Background

The City of Monroe is located in southeastern portion of Snohomish County, immediately north of the King County – Snohomish County boundary, as shown on Figure 2.1, Vicinity Map. The City's corporate boundary is not contiguous to any other municipality. The City encompasses approximately 3,940 acres and but the service area for each of the three utilities varies as shown in Table 3-1.



P:\Mapping\Maps_Generated\Monroe\projects\14-10355.01 Sewer\maps\Utility Systems Plan maps\Fig 2.1 Vicinity Map 8.5x11.mxd 3/18/2015 ctolentino

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MONROE WASHINGTON

Vicinity Map

Utility Systems Plan
City of Monroe, Washington
March 2015

Figure

2.1

2.3.1 Sanitary Sewer System

Monroe was incorporated in 1902 but a sanitary sewer system was not developed until the 1940s. An Imhoff Tank, primary sewage treatment plant was constructed in 1945. This original plant was located on the same parcel as the current plant.

The treatment plant was upgraded to a secondary treatment plant using Rotating Biological Contactors (RBCs) as the biological treatment element in 1975. In addition, this upgrade included influent pumps, an aerated grit chamber, three side hill screens, two rectangular secondary clarifiers, two chlorine contact chambers, two aerobic digesters and a new outfall to the Skykomish River.

In 1993, another treatment plant expansion took place as a result of increased service areas within the City and additional flows resulting from that growth. This expansion included the construction of two rectangular primary clarifiers, four Submerged Biological Contactors (SBCs), a new circular secondary clarifier, an additional aerobic digester, and an effluent pump station.

In 2000, the next modification to the plant included three new activated sludge aeration basins with anoxic zones, a new secondary clarifier, additional Ultra Violet disinfection equipment and a belt filter press.

In 2010, the modifications to the plant included new headworks and grit collection facility and a modification to the Ultra Violet disinfection system. See Chapter SS 7 for a more thorough description of the City's wastewater treatment plant.

In 2014-2015 the City entered into contract with an Energy Service Provider (TRANE) to make some energy efficiency modifications to the plant. This program is administered through the State's Department of Commerce and offers guaranteed energy savings. This grant or low interest loan program is supplemented from matching funds from Snohomish PUD. These improvements include the replacement of the air diffusers in the aeration basin, replacement of the centrifugal blowers with turbo aeration blowers, revisions to the mixers and blowers for the aerobic digesters, and modification to the mixing equipment in the selector basins.

The City provides sanitary sewer service to customers within its sewer service area. Wastewater ultimately flows to Skykomish River through a series of four in-stream diffusers.

2.3.2 Water System

Prior to incorporation, water from a "spring on the hill back of Fern Bluff" was provided by J. E. Dolloff of the Spring Water Company by franchise issued by the Snohomish County Commissioners. Soon after incorporation the Monroe City Council granted a water service contract to Mr. S. A. Buck using water from wells on Buck Island and filtered water from the Skykomish River. In 1905 Mr. Buck turned his water system over to the Monroe Water and Light Company which used two steam pumps located on Buck Island to provide 750 gallons per minute at 90 pounds per square inch. In January of 1905 there were 118 customers of the water system. After years of legal challenges between Buck and Dolloff the City of Monroe developed its own gravity water system using Sykes Springs located approximately 8 miles north of town as the supply.

Sometime between 1905 and 1937 the City of Monroe developed a well field on Ingraham Hill. In 1937, "faced with a rapidly depleting reservoir and a highly unsatisfactory condition at the pumping station" Monroe investigated connecting to the City of Everett pipeline. It appears that this went no farther than investigating as the March 1954, Report of Preliminary Survey of Town of Monroe Domestic Water System states “water for the town of Monroe is obtained by pumping from a well located about two miles from the town”.

In 1963 the City of Monroe began purchasing water from the City of Everett from a wood stave pipeline north of the city. At this time the use of all other sources was discontinued due to the high levels of iron and manganese in the water. The City of Everett replaced the wooden main in 1969 with a 51 inch steel pipe that is known as Transmission Main #5.

The City of Monroe grew with an average rate of 2.2 percent per year from its incorporation in 1902 until 1988 when the population was 3,350. During this time timber and dairy farming dominated the area’s economy. System improvements during this time included:

<u>Ingraham Hill Reservoir</u> – an open in-ground 1.15 million gallon reservoir built in 1920

<u>Wagner Road Transmission Main</u> – 14,000 feet of 12 inch main installed in 1963 when the city connected to the City of Everett system.

<u>179th Avenue Distribution Main</u> – constructed in 1974 from SR 2 to Main Street to serve the developing west side of Monroe.

<u>Chain Lake Road Transmission Main</u> – 21,000 feet of 12 and 16 inch main installed in 1977 to connect the west side of Monroe to the Everett supply.

<u>Trombley Hill Reservoir</u> – a 2.0 million gallon steel reservoir constructed in 1984.

<u>Brown Road Transmission Main</u> – 5,500 feet of 16 inch main installed in 1984 to connect the Wagner Road and Chain Lake transmission mains.

Monroe began to grow rapidly, as the timber and farm industries declined, thanks to the easy access provided by the three state highways. Monroe’s population almost doubled to 6,480 by 1996. Since then the population of Monroe has more than doubled to 16,550. This increase came partially from annexation of additional area but the majority was from new development. Monroe has taken on some of the character of a bedroom community. Many of the occupants of the new residential subdivisions commute to work in the Everett/Seattle/Bellevue area. In addition to providing housing, Monroe also has a thriving industrial area and numerous commercial operations, including four grocery stores and three new car dealerships. In response to this rapid growth, significant changes have taken place in the water system. The major capital improvements include:

<u>Ingraham Hill Reservoir</u> – a 2.0 million gallon steel reservoir built in 2001 to replace the original Ingraham Hill reservoir.

<u>DOC Reservoir</u> – the City acquired a 750,000 gallon reservoir along with a 1,100 gallon per minute booster pump station from the Department of Corrections in 2001.

<u>Tester Road Booster Pump Station</u> – a 1,500 gallon per minute booster pump station to supply the Department of Corrections and the Monroe High School.

North Hill Reservoir and Booster Pump Station — a 1.15 million gallon reservoir and 1,500 gallon per minute booster pump station to supply the upper pressure zone of the system.

Reservoir #5 Trombley Hill Reservoir and Booster Station – a 2.5 million gallon steel reservoir and booster pump station housing one 50 gpm, two 250 gpm and one 3,300 gpm pumps built in 2006 provides storage for the Everett, Trombley, Airport, DOC and Downtown pressure zones.

2.3.3 Stormwater System

The City of Monroe created its Stormwater Management Utility in 1996. The Public Works Department carries out the majority of the programmatic and field-based stormwater tasks.

The Stormwater Management Utility program consists of numerous program elements. These elements are organized into the following four categories based on the department or departments that perform the program element work.

- Design & Construction Division Stormwater Services and Capital Improvement Program
- Operation & Maintenance Division Stormwater Services
- Program Support and Administration

The City lies in the Skykomish River valley at the base of the Cascade foothills. The Skykomish River borders the City on the south. Most of the businesses and residences within the City are located well above the 100-year floodplain. Woods Creek essentially forms the eastern border of the City; although, a small section of the City lies south and east of the creek. The majority of the City, including the commercial corridor along US Highway 2 (US-2), the Fryelands development, and the developing areas north of US-2, lies within the French Creek watershed. French Creek, in turn, flows into the Snohomish River several miles west of the City.

The majority of the City is built on very shallow slopes, typically less than 0.5 percent. The soils within these flat areas are composed of loamy silty sands, which are well suited to farming activities. Beneath these soils lie areas of deep recessional outwash gravels which drain exceedingly well. The City utilizes this natural infiltration capability to assist with control of stormwater runoff.

Due to an increase in impervious surfaces and urbanization, as well as regulatory changes, stormwater quality management has become an important issue. Water quality degradation due to stormwater runoff can occur from many different sources. Stormwater runoff carries sediment from exposed construction sites and pollutants from residential, commercial, and industrial developments and agriculture and livestock into streams and other water bodies. Pollutants in stormwater runoff include metals such as lead, cadmium, zinc, and copper; oil and grease; pesticides and fertilizers; and bacteria. Urbanization within the Puget Sound basin has increased impervious surface areas such as rooftops, streets, and parking areas. Without stormwater control, impervious surfaces increase runoff volumes and peak flow rates. The increased pollutant loads and increased volumes of stormwater runoff result in impacts to downstream properties, to Puget Sound and to other downstream water bodies. Increased impervious surfaces also reduce infiltration to groundwater resources. Due to the listing of Puget Sound salmon species under the federal Endangered Species Act (ESA) and federal regulations under the National Pollution Discharge Elimination System (NPDES), implementation of stormwater control measures has become increasingly important. Approximately two-thirds of the City's stormwater conveyance system consists of pipe. Pipes range in size from eight inches to forty eight inches in diameter, and convey stormwater via outfalls into the receiving waters identified in Figure SW 4.2. Some stormwater pipes have storage or water quality treatment structures built into the system. The City owns approximately 50 miles of stormwater pipe with the pipe inventory consisting primarily of PVC, HDPE and concrete pipe. A portion of the downtown area is a combined sanitary/stormwater sewer which discharges to the wastewater treatment plant.

Culverts are short sections of pipe used to convey stormwater/streamflow and which generally connect open ditches or streams either under or adjacent to roads. Culvert pipes are usually concrete or corrugated metal. There are approximately 21 culverts within the City of Monroe storm drainage system.

Catch basins are underground sumps which are are used to collect stormwater. In Monroe, most catch basins discharge directly into a piped conveyance system. The sump at the bottom of a catch basin is used to capture sediment and other debris from incoming stormwater. Some catch basins are equipped with trapped outlets, which prevent most floating debris and oil from leaving the catch basin. The City owns 1,917 catch basins that are connected to stormwater conveyance piping. A number of catch basins in Monroe do not connect to a piped storm drain system but instead serve as a point for infiltration of the stormwater runoff. These types of catch basins are called “rock holes” and are located in the residential neighborhoods in the southeastern portion of the City between Main Street and the Skykomish River. The City owns approximately 25 rock hole catch basins in this area.

Ditches are constructed earth trenches lined with vegetation or concrete that convey stormwater in areas not served by piped conveyance systems. The City owns approximately 15 miles of ditches.

Biofiltration swales are grass-lined, flat-bottomed ditches whose purpose is to filter the runoff in order to provide water quality treatment. They differ from ditches in that the vegetation must be appropriately maintained to function properly. The shape, slope, width, and length of the swales are specifically designed to achieve appropriate levels of water quality treatment. Most of the biofiltration swales in the stormwater drainage system are privately owned.

Retention/detention ponds and underground storage facilities (such as vaults and pipes) store stormwater runoff. The purpose of these facilities is to temporarily store the runoff so that it can be released at a controlled rate to nearby receiving waters or infiltrated into the ground, preventing potential downstream flooding or erosion.

When land is developed, and no flow control facilities are installed, both the total volume of runoff and the peak flows typically increase due to:

- Loss of vegetation that slows the release of runoff.
- Compaction of the soil column that reduces infiltration rates.
- Placement of impervious surfaces (pavement, rooftops, etc.) that intercept rainfall, preventing soil infiltration and conveying a larger volume of runoff more quickly to a discharge location, thereby increasing the peak flow.

The controlled rate of release from these storage facilities is designed to generally mimic the rate of stormwater runoff that occurred from the land, prior to any development. The volume of runoff these facilities can store is that required to hold the additional volume of water that occurs after development, until it can be released at the appropriate/controlled rate. The City owns 15 detention ponds and nine underground vaults.

Infiltration Trenches. Some locations within the City contain soils that are suitable for stormwater infiltration, and as a result, several infiltration trenches have been constructed. The trenches are located underneath City streets and infiltrate locally generated stormwater runoff. Multiple infiltration trenches typically are located in each infiltration facility, along with water quality pretreatment and an overflow connection to local stormwater or combined piping systems. The stormwater drainage system contains both public and privately owned infiltration facilities.

Oil/water separators are generally underground vaults designed to trap sediments, oil, and floatable materials. The inlet and outlet are typically located on opposite ends of the vault, which is also equipped with baffle walls extending above and below the water surface and with a gap above the floor of the vault. Runoff flows underneath the baffles and out of the vault, while the oil floats to the surface and is retained in the vault by the baffle. Some oil/water separators contain oil-absorbing booms. The City owns seven oil/water separator.

The stormwater drainage system discharges to receiving waters in the Woods Creek, French Creek and Skykomish River watersheds.

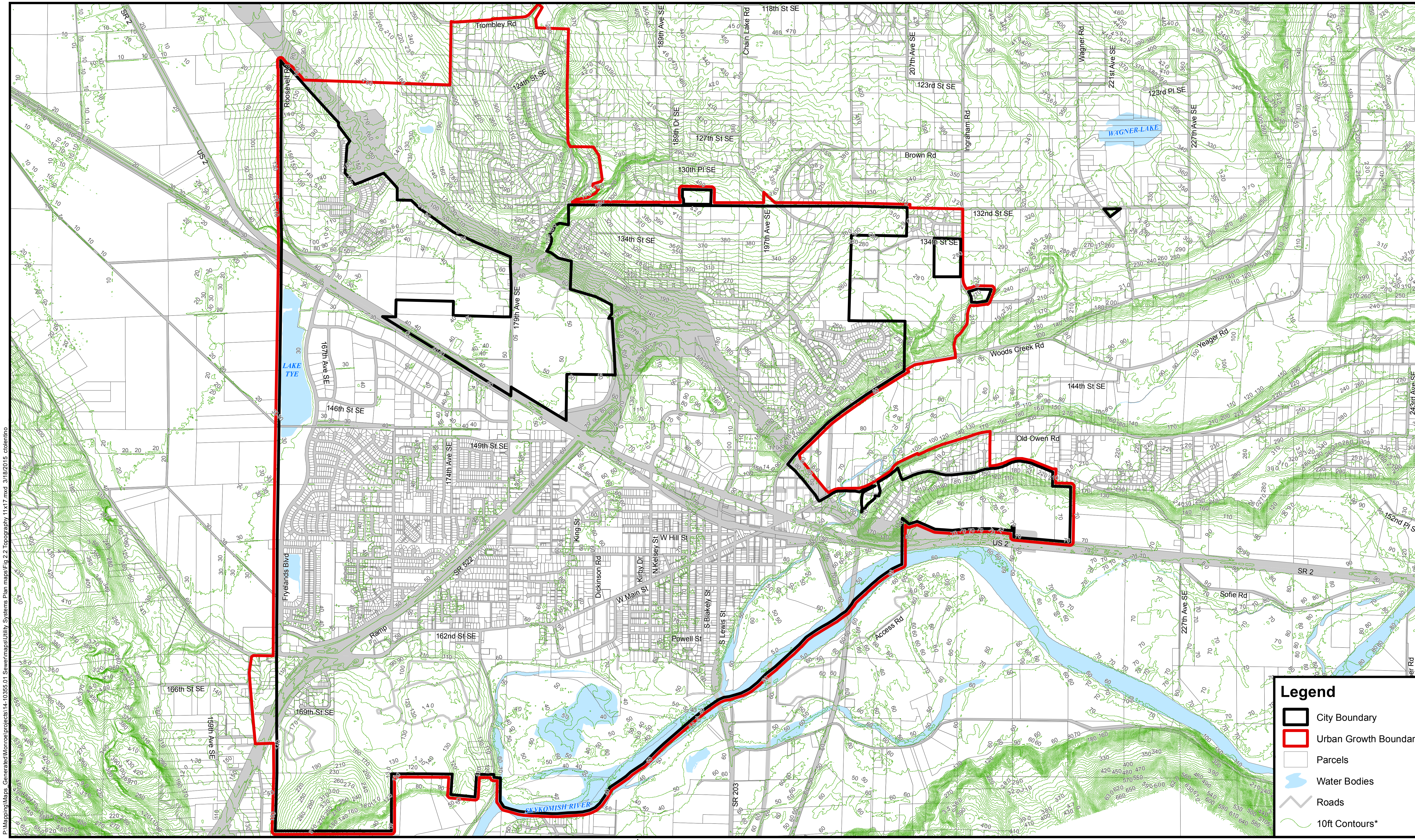
The only City-owned filter treatment systems are located along the storm drain line running from Lewis Street to the outfall into Woods Creek at the intersection of South Ann Street and Fremont Street. These consist of 30 individual canisters located in four vaults.

2.4 Service Area Characteristics and Topography

The City boundaries and the service areas lie entirely within Snohomish County. However, the service areas for the three utilities are varied and differ significantly. The delineation of the service areas for each of the utilities is presented in Chapter 3.

2.4.1 Topography

The geography of the City of Monroe is dominated by the Skykomish Valley outwash plain. The Skykomish valley is oriented east to west and is generally flat, with an elevation ranging from 30 to 80 feet above sea level. Figure 2.2 shows the topography of the Monroe area. The Skykomish River flows in a southwestern direction generally along the southern boundary of Monroe. A few miles southwest of the City, the Skykomish River merges with the Snoqualmie River to form the Snohomish River, which flows into Puget Sound between Everett and Marysville. Woods Creek flows into the Skykomish River through a narrow valley at the eastern end of the City.



P:\Mapping\Maps Generated\Monroe\projects\14-10355.01 Sewer\maps\Utility Systems Plan maps\Fig 2.2 Topography 11x17.mxd 3/18/2015 ctolentino

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*10ft Contours extracted from LIDAR data. Source: Puget Sound LIDAR Consortium, Snohomish County Dataset 2005-2006.
Municipal Boundaries: City of Monroe July 2013
Snohomish County base data 2014
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NORTH

0 1,000 2,000 4,000 Feet

Topography Map
Utility Systems Plan
City of Monroe, Washington
March 2015

Figure
2.2

The Rivmont Plateau, to the east of the City, is located between the Woods Creek valley and the Skykomish River valley, and rises abruptly to elevations of 200 feet. The service area includes several hills sloping upwards from the Skykomish River valley to the north, with maximum elevations of approximately 420 feet. The Monroe Correctional Complex is located on a knoll with a maximum elevation of 140 feet in the southwestern portion of the service area. At the extreme southwestern corner of the service area is a hill with a maximum elevation of 320 feet.

2.4.2 Water Features

Wetlands are found adjacent to the many creeks, small streams and lakes within the City service areas (see Figure 2.3).

Surface Water – The most dominant fresh water feature in the service area is Lake Tye which is located along the western boarder of the City Limits adjacent to the Frylands development. The lake has a surface area of approximately 38 acres.

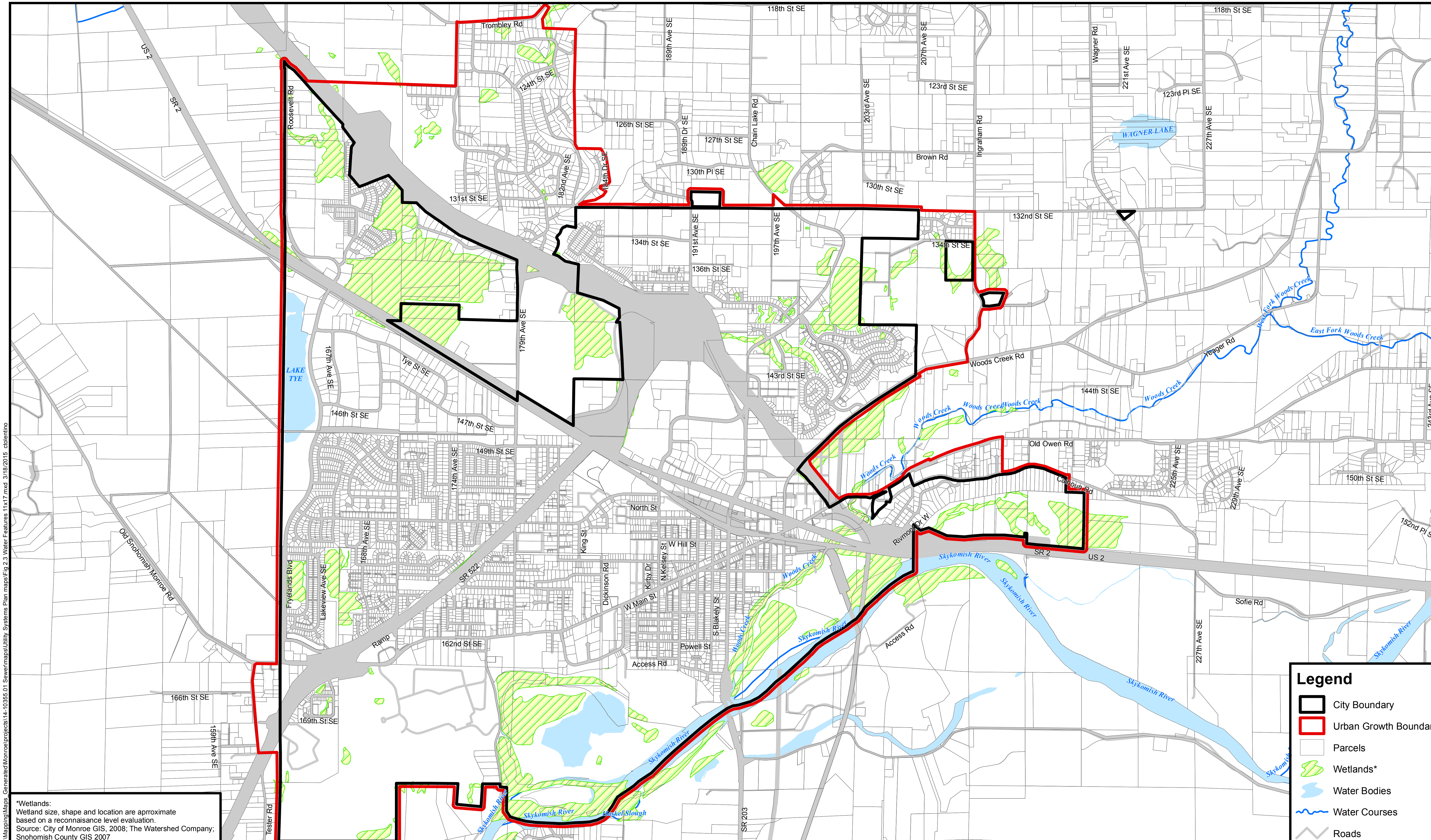
Woods Creek bisects the southeastern corner of the City which enters the Skykomish River at the SR 203 bridge.

Groundwater – A study done in 1997 by the US Geological Survey found that 94% of the groundwater in South Snohomish County was considered soft to moderately hard. No appreciable widespread groundwater contamination was found at the time of the study.

Concentrations of arsenic, iron and manganese were the most widespread groundwater problems in the area. The population growth in Snohomish County has increased dramatically in the last 10 years and has affected the quantity and the quality of groundwater. Most groundwater recharge in Snohomish County is from infiltration of precipitation, and impervious surfaces caused by increased development prevent infiltration. Consequently, less groundwater is becoming available as land development increases.

2.4.3 Geology

The retreat of glaciers at the end of the last ice age formed the rolling terrain characteristic of the City. Erosion and flooding of low lying areas during that period resulted in soil deposits of two primary classifications as identified by the Washington State Department of Natural Resources, 2005. These soil types are described below and displayed on Figure 2.4.



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Water Bodies & Courses: Snohomish County.

Snohomish County base data 2014
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NORTH

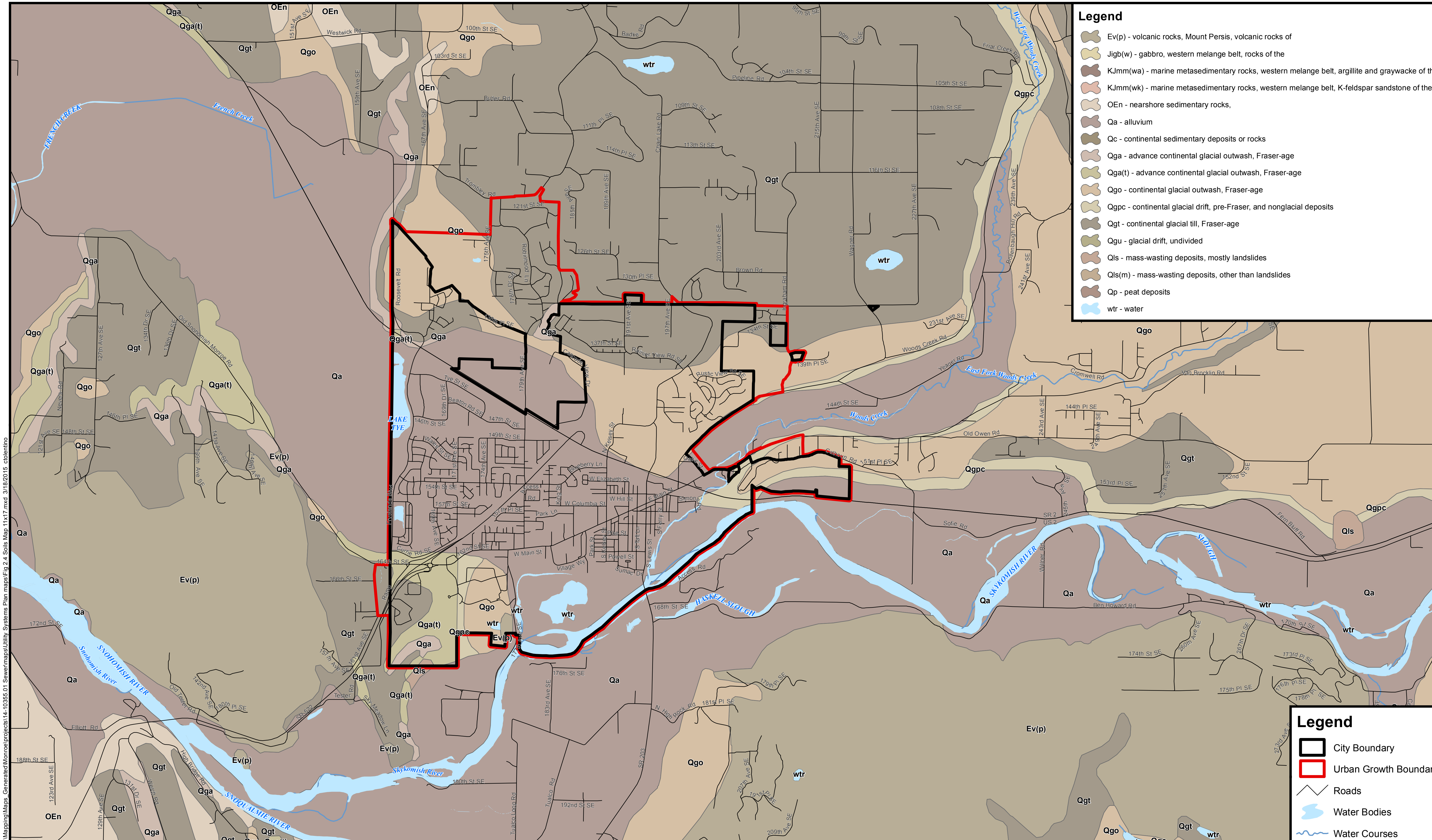
0 1,000 2,000 4,000 Feet

MONROE WASHINGTON

Water Features

Utility Systems Plan
City of Monroe, Washington
March 2015

Figure
2.3



P:\Mapping\Maps_Generated\Monroe\projects\14-10355.01 Sewer\maps\Utility Systems Plan maps\Fig 2.4 Soils Map 11x17.mxd 3/18/2015 ctolentino

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Soils data: Washington State Department of Natural Resources 2005

Snohomish County base data 2014
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NORTH

0 1,750 3,500 7,000 Feet

MONROE WASHINGTON

Soils Map
Utility Systems Plan
City of Monroe, Washington
March 2015

Figure
2.4

The Skykomish River valley primarily consists of alluvial soils, at depths up to 100 feet. The primary soil type in central Monroe is an alluvial soil, with upper layers of silt loams and silty clay loams, with underlying very fine sandy loam or sand. The soil has moderately low permeability and during the winter has a high groundwater table (2 to 4 feet below grade). The western portion of the service area also contains a few areas with other types of alluvial soils, including some that are poorly drained.

The hills north of the City Limits consist of glacial till. Glacial till includes large rocks and pockets or streaks of sand and gravel. Glacial till is essentially impervious. The upper layers of soils are typically gravelly loam, underlain by hardpan or glacial till. Permeability through the hardpan is very slow, and a perched water table may occur during heavy rains in some areas.

The Rivmont plateau has primarily Everett gravelly sandy loam soils, which are somewhat excessively drained.

The southwest portion of the service area, including the Monroe Correctional Complex, consists of silt loam soils, which have low permeability. The service area includes soils that have the potential for commercial sand and gravel operations, especially near current and previous riverbeds, and on steep slopes.

Soil factors in the Skykomish River valley that may affect planning are the potential for flooding or poor drainage, especially in the western portion of the service area. Soil factors on the hills surrounding the valley that may affect planning include steep slopes and erosion/landslide potential. In addition, areas with glacial till have low permeability and some areas may not be suitable for septic tank drainfields.

2.5 City Extension Policies

Development of the City's Comprehensive Sewer Plan is currently guided by the Comprehensive Plans from the adjacent agencies.

The City's policy for services recognizes that its function is not to plan land uses for the service area but to respond to land uses planned by the land use planning agencies.

The public utility systems in the City may be extended by one of two methods, one being a developer extension agreement, where a developer, property owner or a group of property owners request and construct a sewer under the terms and conditions of a developer extension agreement. The second method is a Local Improvement District (LID) process following RCW 35.43.040 and 35.43.042, where a group of property owners petition the City to extend utilities to their area and then are assessed for the improvements.

It is the City's policy that the property owners desiring utility service initiate a request for service. After entering a Developer's Extension Agreement with the City, the proposed design will be reviewed by the City to ensure compliance with the standards and design criteria. All utility extensions shall follow the current version of the City of Monroe's design and construction standards and as defined in the City's "Developer Extensions Manual." Once the improvements have been constructed and confirmed through the City inspection to meet established standards, then it shall be deeded to the City.

The City Council has the authority to set policies, ordinances, and zoning. The City may find it necessary from time to time to reevaluate their policies based on Snohomish County land use, policies and ordinances.

Chapter 3 Land Use and Service Area

3.1 Service Area Description

The existing utility service area for the City can be described as comprising of two general areas, City of Monroe and Snohomish County. Aside from water associations or water districts, there are no other governmental jurisdictions in the service area.

Table 3-1 presents the service area of each of the three utilities and separates those service areas into portions within the corporate boundaries, outside the City Limits but within the UGA boundary and that portion that is outside the UGA boundaries. The 'total' acres shown are the ultimate service area.

Table 3-1 Utility Service Area

	Sanitary Sewer Utility (acres)	Water System Utility (acres)	Stormwater Utility (acres)
Within Monroe Corporate Boundaries	3,940	3,940	3,940
Outside City Limits but within UGA	953	450	0
Outside UGA	298[1]	5,700	0
Total Acreage	5,191	10,090	3,940

Notes:
1) Southwest Study Area

City of Monroe. The City of Monroe's municipal boundaries comprise of 3,940 acres. All of the Monroe corporate area is within the service area of the utilities. All of the area served by the sanitary sewer utility is collected and treated by the City's WWTP. Similarly, all of the City water customers are served with Monroe water purchased from Everett Public Utilities. The stormwater utility can be extended beyond the UGA, but currently no such extensions exist. The City both owns and maintains these portions of the system and is responsible for treatment, conveyance, distribution and storage.

Snohomish County. Portions of Snohomish County fall within the service areas of the utilities. Before providing sanitary sewer service to parcel outside the corporate boundaries, it is the City's policy to annex those parcels into the City. Extending sanitary service beyond the UGA boundary is allowed only under very unique circumstances. Water service is provided into Snohomish County. Stormwater service can be, but currently is not extended into Snohomish County.

3.2 Surrounding Vicinity Characteristics

3.2.1 Topography

Figure 2.2 shows the topography of the City and the surrounding areas. This figure also includes City's service area boundary and the corporate boundaries as described in Section 3.1.

The topography of the City ranges from flat and gently rolling to hilly, with a few steep slopes along the stream corridors. Wetlands, lakes and many creeks and small streams are found throughout the City.

3.2.2 Water Resources

The City's municipal water system provides service to the entire population within the City limits. The other residents outside the City limits are served by adjacent water purveyors as described in Chapter W 4.

All water supplied to the City customers is currently purchased from the Everett Public Utilities through the Sultan River source and is delivered from the Everett pipeline.

Interties are also provided as shown on Figure W 4.2.

3.3 Land Use

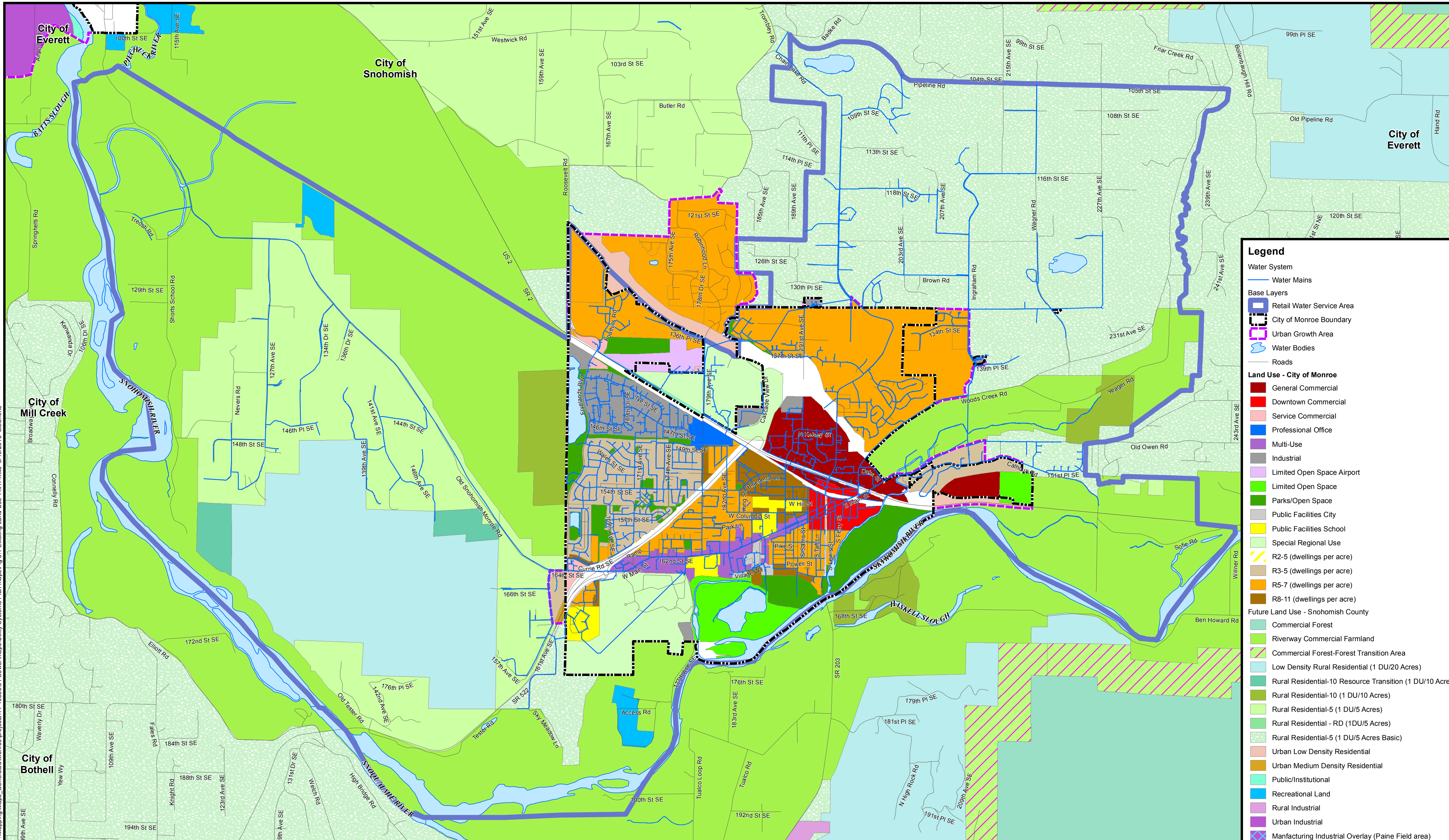
3.3.1 Growth Management Act

The State of Washington adopted the Growth Management Act with the intent of concentrating most new development and population gains within urban areas of the more populous and rapidly growing counties. These counties are required to define an urban growth boundary within which urban services like sewers are provided, and any new parcels created outside that boundary must be low density with sufficient acreage to support onsite sewage disposal systems conforming to State Health regulations.

The entire sanitary sewer service area is within the GMA boundaries of the City for urban development. Extending sewers beyond the GMA boundaries for essential governmental facilities and documented health hazard areas has not arisen. The Southwest Study Area is outside the GMA boundaries, and consequently is not included as part of the Service Area. Consideration of this area was investigated assuming a potential expansion of the GMA boundaries in the future.

The service area for water does not have the same limitations as sanitary sewer. Consequently, the water service does extend beyond the GMA boundaries.

Zoning within the City Limits area can be classified as commercial/industrial, low density multi-family, high density multi-family, single family, and undeveloped lands such as public right of ways, parks, and open space. These zoning areas are depicted in Figure 3.1. Low density multi-family zoning allows a variety of low-density, multi-family housing including townhouses, multi-family structures and attached or detached homes on small lots.



P:\Mapping\Maps_Generated\Monroe\projects\14-10355.01 Sewer\maps\Utility Systems Plan maps\Fig 3.1 Existing Land Use 11x17.mxd 3/19/2015 ctolentino

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Land Use: City of Monroe August 2014
Future Land Use: Snohomish County November 2013

Water System: City of Monroe 2014
Snohomish County base data 2014
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NORTH

0 3,500 7,000 Feet

MONROE WASHINGTON

Existing Land Use
Utility Systems Plan - Water
City of Monroe, Washington
March 2015

Figure
3.1

3.4 Relationships with Adjacent Agencies

The issue of managing and coordinating which agency provides services can be an emotionally charged matter. Consequently, adjudicating such issues typically falls to a county-supported Board Review Board.

In Monroe's case, there are no adjacent agencies that can provide sanitary sewer service. The nearest provider is the City of Sultan. Neither Monroe nor Sultan extends sewer service beyond their GMA boundaries and consequently, there are no overlapping issues with neighboring agencies.

Stormwater utilities are typically provided by municipalities. Like the sanitary sewer service, the nearest stormwater utility is in the City of Sultan. Stormwater, even more than sanitary sewer service, is dictated by the topography. No adjacent municipalities have stormwater utilities that reach to the service area of Monroe.

Providing water service, however, is complicated by the fact that GMA limitations do not apply and the fact that there are several water districts or associations adjacent to Monroe's water service boundary. These water purveyors are presented on Figure W 4.4.

The adjacent water purveyors are listed below.

- Cross Valley Water District
- City of Snohomish
- Roosevelt Water Association
- Meadow Lake Water Association
- SnoPUD Integrated 2
- SnoPUD Integrated 3
- Highland Water District

3.5 Service Areas

3.5.1 Sanitary Sewer

Figure SS 4.1 shows the extent of the existing sanitary sewer system. This figure also shows the current Urban Growth Area (UGA). The UGA boundary establishes the line beyond which sanitary sewers cannot be extended.

The general policy that governs UGA is that urban type services are not to be extended beyond those limits. However, in certain circumstances this limitation can be modified and sewer service can be provided. In the case of documented Health Hazard areas or critical/essential governmental facilities, sewers can be provided beyond the UGA boundary.

3.5.2 Water

Figure W 4.2 shows the extent of the current water system. The water utility does not fall under the same UGA limitations as applied to the sanitary sewer system and consequently, the water utility reaches far beyond the UGA boundaries. This figure also shows the surrounding water purveyors in relation to the City's water service boundaries.

3.5.3 Stormwater

Within the corporate City limits, there are three main drainages. These three include the Woods Creek, Skykomish River and French Creek. The extent of these drainages reaches far beyond any corporate boundaries or UGA boundaries. Figure SW 4.1 shows some or all of the catchment area of these drainage basins.